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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/781,783	02/20/2004	Hiroki Ooi	1075.1251	4549

21171 7590 06/19/2007

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EXAMINER	
KIM, DAVID S	

ART UNIT	PAPER NUMBER
2613	

MAIL DATE	DELIVERY MODE
06/19/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/781,783	OOI ET AL.	
	Examiner	Art Unit	
	David S. Kim	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 March 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. **Claims 1-13** are rejected under 35 U.S.C. 103(a) as being unpatentable over Tager et al. (U.S. Patent Application Publication No. US 2004/0208608 A1, hereinafter "Tager").

Regarding claim 1, Tager discloses:

A wavelength division multiplexing optical repeating transmission method (Fig. 4) for performing repeating transmission of a wavelength multiplexed optical signal along an optical transmission line interconnecting a terminal apparatus for transmission (115) and a terminal apparatus for reception (116) and having a plurality of divisional repeating intervals into which the optical transmission line is divided by a plurality of repeating apparatuses (117), comprising steps executed by each of said repeating apparatuses disposed at end points of the divisional repeating intervals, the steps including:

a first dispersion compensation step (note the dispersion compensation previous to each site 117 that can be obviously embodied by DCM 113A of Fig. 2B) of compensating for a dispersion included in the wavelength multiplexed optical signal having propagated in the divisional repeating interval on the

terminal apparatus side transmission so <u>that a remaining dispersion amount is</u> within a tolerance set in advance;

an optical add/drop multiplexing step (implied by switching site 117 that can be obviously embodied by add/drop node 109 of Fig. 2B) of performing an optical add/drop multiplexing for the wavelength multiplexed optical signal for which the dispersion compensation has been performed at the first dispersion compensation step; and

a second dispersion compensation step (note the dispersion compensation after each site 117 that can be obviously embodied by DCM 113B of Fig. 2B) of performing a dispersion compensation with an <u>additional</u> compensation (notice the <u>additional</u> compensation past the zero line after each 117 site) amount <u>to the compensation amount of the first dispersion compensation step</u> for the wavelength multiplexed optical signal for which the optical add/drop multiplexing has been performed at the optical add/drop multiplexing step;

the ratio of the <u>additional</u> compensation amount at the second dispersion compensation step to the sum of the dispersion compensation amounts at the first and second dispersion compensation steps being set so as to gradually vary together with the transmission distance (e.g., Fig. 4, the over compensation amount at each site 117 decreases with increasing distance and the sum remains constant, thus, the ratio of (decreasing value/constant) gradually decreases with the distance) from said terminal apparatus transmission at which said repeating apparatus is disposed on said light transmission line (Applicant's ratio can be visually noticed by the dispersion map of Applicant's Fig. 20, which is similar to the dispersion map of Tager's Fig. 4).

Tager does not expressly disclose:

the optical add/drop multiplexing step of performing an optical add/drop multiplexing ***for each wavelength components of the wavelength multiplexed optical signal*** for which the dispersion compensation has been performed at the first dispersion compensation step.

However, performing optical add/drop multiplexing *for each wavelength component* of a wavelength multiplexed optical signal is an extremely common practice in the art. At the time the

invention was made, it would have been obvious to one of ordinary skill in the art to perform such optical add/drop multiplexing in the method of Tager. One of ordinary skill in the art would have been motivated to do this since it provides the feature of access to each wavelength component/channel in a wavelength multiplexed optical signal, thus providing the benefit of maximum flexibility in processing each wavelength component/channel for various common practices, such as monitoring, wavelength assigning, regeneration, channel switching, etc.

Tager does not expressly disclose:

said additional compensation amount is a predetermined constant times a total dispersion amount occurred in the divisional repeating intervals on the terminal apparatus side for transmission.

Similar to Applicant's own Fig. 3, notice the additional compensation past the zero line for each 117 site in Tager. Similar to Applicant's own Fig. 3, the amount of additional compensation past the zero increases at a constant rate as there is an increase in total dispersion amount occurred in the divisional repeating intervals on the terminal apparatus side for transmission. As Applicant's own Fig. 3 can be described according to the "predetermined constant times a total dispersion amount occurred in the divisional repeating intervals on the terminal apparatus side for transmission", so Fig. 4 of Tager can be described similarly. At the time the invention was made, it would have been obvious to one of ordinary skill in the art to describe the Fig. 4 of Tager in this way. One of ordinary skill in the art would have been motivated to do this to communicate more complete details of the dispersion map of Fig. 4 of Tager to any practitioner who would design and implement an actual embodiment of the optical transmission system of Fig. 4 of Tager. That is, the dispersion map of Fig. 4 of Tager is informative but not comprehensive enough to provide all of the exact details and parameters for designing and implementing an actual embodiment of the optical transmission system of Fig. 4 of Tager. Additional descriptive information, such as the "predetermined constant times a total dispersion amount occurred in the divisional repeating intervals on the terminal apparatus side for transmission", helps to provide such needed details and parameters.

Regarding claim 2, Tager does not expressly disclose:

The wavelength division multiplexing optical repeating transmission method as claimed in claim 1, wherein a predetermined proportion for performing the dispersion compensation process by the over compensation amount at the second dispersion compensation step is set so as to gradually ***increase*** together with the transmission distance from said terminal apparatus for transmission at which of said repeating apparatus is disposed on said light transmission line.

Rather, Tager shows a gradual decrease in Fig. 4. That is, there is less "over" compensation as the distance increases. However, it is a known and obvious technique to simply flip dispersion maps. Tager suggests such obviousness by mentioning over-compensation and under-compensation (end of paragraph [0032]). Accordingly, an obvious variation would include a gradual *increase*.

Regarding claim 3, Tager discloses:

The wavelength division multiplexing optical repeating transmission method as claimed in claim 1 wherein a predetermined proportion for performing the dispersion compensation process of the over compensation amount at the second dispersion compensation step is set so as to gradually decrease together with the transmission distance from said terminal apparatus for transmission at which of said repeating apparatus is disposed on said light transmission line (Fig. 4, there is less "over" compensation as the distance increases).

Regarding claim 4, Tager discloses:

The wavelength division multiplexing optical repeating transmission method as claimed in claim 1, further comprising a residual dispersion compensation step executed by each said repeating apparatus of compensating, where a residual dispersion appears in an optical signal of each wavelength before and after the optical add/drop multiplexing process at the optical add/drop multiplexing step, for the residual dispersion (suggested by adjustable and tunable dispersion compensators of paragraphs [0033-0034]).

Regarding claim 5, Tager discloses:

The wavelength division multiplexing optical repeating transmission method as claimed in claim 1, further comprising transmission side dispersion compensation step of performing a dispersion compensation (Fig. 4, notice initial dispersion compensation adjacent to 115) which satisfies a transmission condition for a wavelength multiplexed optical signal to be transmitted in said terminal

apparatus for transmission (this transmission condition is so broad as to include any number of suitable conditions, such as the amount or sign of dispersion compensation).

Regarding claim 6, Tager does not expressly discloses:

The wavelength division multiplexing optical repeating transmission method as claimed in claim 5, wherein the transmission condition relates to at least one of the kind of fiber, the transmission distance and the bit rate.

However, consider the example transmission condition provided in the treatment of claim 5 above: the amount or sign of dispersion compensation. Different kinds of fiber provide different amounts or signs of dispersion, so the transmission condition discussed can obviously be related to at least the kind of fiber.

Regarding claims 7-9, claims 7, 8, and 9 are apparatus claims that introduce limitations that correspond to the limitations introduced by method claims 1, 2, and 3, respectively. Therefore, the recited steps in method claims 1-3 read on the corresponding means in apparatus claims 7-9.

Regarding claim 10 and 11, Tager does not expressly disclose the variable dispersion compensation apparatus of claim 10 and the dispersion slope compensation device of claim 11. However, both types of apparatuses are commonly known in the art. At the time the invention was made, it would have been obvious to one of ordinary skill in the art to provide an obvious variation of the apparatus of Tager by implementing these types of apparatuses. One of ordinary skill in the art would have been motivated to do this since they are generally known to provide additional flexibility and precision in compensating dispersion.

Regarding claim 12, claim 12 is an apparatus claim that introduces limitations that correspond to the limitations introduced by method claim 4. Therefore, the recited steps in method claim 4 read on the corresponding means in apparatus claim 12.

Regarding claim 13, claim 13 is an apparatus claim that introduces limitations that correspond to the limitations introduced by method claim 1. Therefore, the recited steps in method claim 1 read on the corresponding means in apparatus claim 13.

Response to Arguments

4. Applicant's arguments filed on 30 March 2007 have been fully considered but they are not persuasive. Applicant states,

> "Tager discloses a dispersion compensation architecture which is different from the present invention because Tager is silent regarding the claimed features of 'a first dispersion compensation step,' 'an optical add/drop multiplexing step,' and 'a second dispersion compensation step' (see claim 1 of the present invention).
>
> Similar to claim 1, independent claim 7 (as amended herein) recites the features of 'a first dispersion compensation section,' 'an optical add/drop multiplexing section,' and 'a second dispersion compensation section,' which are not disclosed or suggested in Tager reference. Therefore, it is submitted that Tager is also silent regarding the features as recited in claim 7 of the present invention" (REMARKS, p. 8, 2nd-3rd full paragraphs).

Examiner respectfully notes that the standing rejections already addressed the limitations of a "first dispersion compensation step", "an optical add/drop multiplexing step", and "a second dispersion compensation step" (mailed on 02 November 2007, p. 2-3). However, Applicant does not address the merits of the standing treatment of these limitations. Accordingly, Applicant's argument is not persuasive.

To further elaborate on the standing treatment of these limitations, a more detailed explanation is provided below:

First, notice the dispersion map of Fig. 4. Each instance of 117 indicates a switching site (paragraph [0032]). Examples of such switching sites are shown by nodes 109 and 110 in Fig. 2B (implied in paragraph [0031]). In Fig. 4, dispersion is pre- and post-compensated at nodes (paragraph [0033]), including at each instance of 117. Such dispersion compensation is performed by DCMs 113A-113E (paragraph [0031]). Also note that the dispersion is zero at each instance of 117.

Regarding the "first dispersion compensation step", the standing rejection states, "note the dispersion compensation previous to each site 117 that can be obviously embodied by DCM 113A of Fig. 2B". That is, before each site 117, there is dispersion compensation. As disclosed in paragraph [0031], dispersion compensation is performed by DCMs 113A-113E. In the case of optical signals propagating from left to right, DCMs 113A and 113C are located before the switching planes in nodes 109 and 110. Before switching a signal to another location, one would generally want the dispersion value to be zero

since dispersion is an aspect of undesired optical signal deterioration (paragraph [0005]). Accordingly, one would be motivated to employ DCMs 113A and 113C to bring the dispersion value to zero. Thus, DCM 113A is a suitable and obvious choice from among these DCMs to provide this dispersion compensation previous to each switching site 117. Therefore, the dispersion compensation of DCM 113A would provide an example of the "first dispersion compensating step".

Regarding the "optical add/drop multiplexing step", the standing rejection states, "implied by switching site 117 that can be obviously embodied by add/drop node 109 of Fig. 2B". That is, notice that examples of switching sites 117 are shown by nodes 109 and 110 in Fig. 2B (implied in paragraph [0031]). In the case that switching 117 can be embodied by add/drop node 109 in Fig. 2B, notice the ADD and DROP functions in add/drop node 109. Therefore, the add/drop multiplexing of node 109 would provide an example of the "add/drop multiplexing step".

Regarding the "second dispersion compensation step", the standing rejection states, "note the dispersion compensation after each site 117 that can be obviously embodied by DCM 113B of Fig. 2B". That is, after each site 117, there is additional dispersion compensation. As disclosed in paragraph [0031], dispersion compensation is performed by DCMs 113A-113E. In the case of optical signals propagating from left to right, DCMs 113B and 113D are located after the switching planes in nodes 109 and 110. Before propagating a signal to another node, Fig. 4 shows that there is additional dispersion compensation after each site 117. Accordingly, one would implement this additional dispersion compensation by some kind of DCM. Thus, DCM 113B is a suitable and obvious choice from among these DCMs to provide this additional dispersion compensation after each switching site 117. Therefore, the dispersion compensation of DCM 113B would provide an example of the "second dispersion compensating step".

As explained above, the standing rejections have already treated the limitations of a "first dispersion compensation step", "an optical add/drop multiplexing step", and "a second dispersion compensation step" (mailed on 02 November 2007, p. 2-3). Accordingly, Applicant's arguments are not persuasive. Therefore, Examiner respectfully maintains the standing rejections.

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David S. Kim whose telephone number is 571-272-3033. The examiner can normally be reached on Mon.-Fri. 9 AM to 5 PM (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth N. Vanderpuye can be reached on 571-272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DSK

KENNETH VANDERPUYE
SUPERVISORY PATENT EXAMINER